Roll No:

NATIONAL INSTITUTE OF TECHNOLGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
END SEMESTER EXAMINATION – MAY 2021

Time: 2 hrs **Sub: Software Engineering (CS6402/6CS121)** **Max. Marks: 40**

Answer all questions. Answer to sub questions must be given sequentially at one place.

Write your Roll. Number on each page of the answer sheet.

1. Answer the following question.
   a. Draw a labelled DFD for the following **time management software (TMS)**. Clearly show the context diagram and its hierarchical decompositions up to level 2. **(8 marks)**
   A company needs to develop a time management system for its executives. The software should let the executives register their daily appointment schedules. The information to be stored includes person(s) with whom meeting is arranged, venue, the time and duration of the meeting and the purpose (eg. for a specific project work). When a meeting involving many executives needs to be organized, the system should automatically find a common slot in the diaries of the concerned executives and arrange a meeting (i.e. make relevant entries in the diaries of all the concerned executives) at that time. It should also inform the concerned executives about the scheduled meeting through e-mail. If no common slot is available, TMS should help the secretary to rearrange the appointments of the executives in consultation with the concerned executives for making room for a common slot. To help the executives check their schedules for a particular day the system should have a very easy-to-use graphical interface. Since the executives and the secretaries have their own desktop computers, the time management software should be able to serve several remote requests simultaneously. Many of the executives are relative novices in computer usage. Everyday morning the time management software should e-mail every executive his appointments for the day. Besides registering their appointments and meetings, the executives might mark periods for which they plan to be on leave. Also, executives might plan out the important jobs they need to do on any day at different hours and post it in their daily list of engagements. Other features to be supported by the TMS are the following: TMS should be able to provide several types of statistics such as which executive spent how much time on meetings. For which project how many meetings were organized for what duration and how many man-hours were devoted to it. Also, it should be able to display for any given period of time the fraction of time that on the average each executive spent on meetings.
   b. Give the structured design for TMS. **(4 marks)**
   c. If the TMS is developed using Object-Oriented approach, then give at least three different UML diagrams so that it covers three different views which have been used while designing in your opinion. **(12 marks)**

2. Assume you are a software project manager and that you've been assigned to handle the schedule for a small project. The project has 56 planned work tasks that are estimated to require 582 person-days to complete. At the time you have been assigned, 12 tasks have been completed. However, the project schedule indicates that 15 tasks should have been completed. The following scheduling data (in person-days) are available.

Task	Planned Effort	Actual Effort
1	12.0	12.5
2	15.0	11.0
3	13.0	17.0
4	8.0	9.5
5	9.5	9.0
6	18.0	19.0
7	10.0	10.0
8	4.0	4.5
9	12.0	10.0
10	6.0	6.5
11	5.0	4.0
12	14.0	14.5
13	16.0	--
14	6.0	--
15	8.0	--

By how many person-days the schedule slippage has occurred? What is the loss incurred due to this is if there are 20 employees and their average cost of single person-day is Rupees 9500/-. How would you handle this issue, so that the loss incurred is minimized? **(1+1+2 marks)**

3. Which of the SDLC models would you use for the following type of projects and justify how.

   a. Features are released as soon as they are useful. Over time, existing features are improved and new features are added.

   b. All the application's features are released at the same time with full fidelity.

   (2 + 2 marks)

4. The following code shows a C# version of the `AreRelativelyPrime` method and the GCD method it calls.

```
// Return true if a and b are relatively prime.
private bool AreRelativelyPrime (int a, int b)
{
//only 1 and -1 are relatively prime to 0.
if (a == 0) return ((b == 1) || (b == -1));
if (b == 0) return ((a == 1) || (a== -1));
int gcd = GCD(a, b);
```

```
return ((gcd == 1) || (gcd == -1));
}
// use Euclid's algorithm to calculate the greatest common divisor
(GCD) of two numbers.
private int GCD (int a, int b)
{
a = Math.Abs(a);
b = Math.Abs(b);
// If a or b is 0, return the other value.
if (a = = 0) return b;
if (b = = 0) return a;
for (  ;   ;  )
{
int remainder = a % b;
if (remainder = = 0) return b;
a = b;
b = remainder;
};
}
```

Determine the cyclomatic complexities of the individual functions and as a program whole. Give the flow graph of the code and corresponding test suite that tests the code. **(2 + 2 marks)**

5. a) Do you think that process improvement programs, which involve measuring the work of people in the process and introducing changes into that process can be inherently dehumanizing? What resistance to a process improvement program might arise and why? **(3 marks)**

   b) Can we use CASE tools for performing reverse engineering? If so, give an example. **(1 mark)**

*** All the Best ***